

What is claimed is:

1. A multi-thermal zone shielding apparatus for shielding a portion of a hot
workpiece in a high temperature processing system, the apparatus keeping
the workpiece temperature hot at the shielded area and maintaining the rest
of the shield cooler, the apparatus comprising:
- a) a heater means for heating the workpiece within the system;
 - b) a multi-thermal zone shield for engaging a portion of the workpiece and
shielding the engaged portion of the workpiece during processing thereof
to prevent processing on the engaged portion of the workpiece, the multi-
thermal zone shield comprising
 - a low thermal transmittivity section in the portion of the shield to be
engaged and shielding the workpiece, the low transmittivity section
preventing the heat lost of the shielded portion of the hot workpiece
due to less thermal energy transmitting through the shielding portion
of the shield, thus maintaining a more uniform temperature at the
shielded portion of the workpiece;
 - a high thermal transmittivity section in the rest of shield, the portion of
the shield not engaged with the workpiece having high thermal
transmittivity to allow more thermal energy from the heater means and
from the hot workpiece transmitting through the shield without
heating the shield, thus maintaining a cooler temperature at the
portion of the shield not engaged with the workpiece;
 - c) a moving means for engaging the shield with the portion of the workpiece.

2. An apparatus as in claim 1 in which the shield is made of transparent material, and the low thermal transmittivity section of the shield is processed to achieve an opaque property.
- 5 3. An apparatus as in claim 1 in which the low thermal transmittivity section of the shield is made of opaque material and the high thermal transmittivity section of the shield is made of transparent material.
- 10 4. An apparatus as in claim 1 in which the shield is made of quartz or glass material, and the low thermal transmittivity section of the shield is processed to become opaque and the high thermal transmittivity section of the shield is processed to become transparent.
- 15 5. An apparatus as in claim 1 in which the heater means comprises a heated workpiece support having a heated top surface for supporting and heating the workpiece.
- 20 6. An apparatus as in claim 1 in which the heater means comprises a lamp heater for heating the workpiece and the apparatus further comprises a non-heated workpiece support for supporting the workpiece.
7. An apparatus as in claim 5 in which the moving means for engaging the shield with the portion of the workpiece comprises a movable shaft connected to the heated workpiece support.

8. An apparatus as in claim 6 in which the moving means for engaging the shield with the portion of the workpiece comprises a movable shaft connected to the non-heated workpiece support.

9. An apparatus as in claim 5 in which the heated workpiece support comprises a taper outer edge and the shield comprises a taper inner edge of similar angle, whereby the shield may be moved into alignment with the workpiece support in the engaged position.

10. An apparatus as in claim 1 further comprising a shield support means for supporting the shield so that the shield and the workpiece are spaced apart when the moving means disengages the workpiece from the shield.

11. A multi-thermal zone shielding apparatus for shielding a portion of a hot workpiece in a high temperature processing system, the apparatus keeping the workpiece temperature hot at the shielded area and maintaining the rest of the shield cooler, the apparatus comprising:

a) a heated workpiece support for heating and supporting the workpiece within the system;

b) a multi-thermal zone shield for engaging a portion of the workpiece and shielding the engaged portion of the workpiece during processing thereof to prevent processing on the engaged portion of the workpiece, the multi-thermal zone shield comprising

- a low thermal transmittivity section in the portion of the shield to be engaged and shielding the workpiece, the low transmittivity section preventing the heat lost of the shielded portion of the hot workpiece due to less thermal energy transmitting through the shielding portion

of the shield, thus maintaining a more uniform temperature at the shielded portion of the workpiece;

- a high thermal transmittivity section in the rest of shield, the portion of the shield not engaged with the workpiece having high thermal transmittivity to allow more thermal energy from the heater means and from the hot workpiece transmitting through the shield without heating the shield, thus maintaining a cooler temperature at the portion of the shield not engaged with the workpiece;

c) a moving means for engaging the shield with the portion of the workpiece;

e) a non-reactive gas inlet for providing a non-reactive gas to a cavity defined by the heated workpiece support, the workpiece, and the shield, the cavity retaining the non-reactive gas in the vicinity of the shielded portion of the workpiece.

12. An apparatus as in claim 11 in which the shield is made of transparent material, and the low thermal transmittivity section of the shield is processed to achieve an opaque property.

13. An apparatus as in claim 11 in which the low thermal transmittivity section of the shield is made of opaque material and the high thermal transmittivity section of the shield is made of transparent material.

14. An apparatus as in claim 11 in which the shield is made of quartz or glass material, and the low thermal transmittivity section of the shield is processed to become opaque and the high thermal transmittivity section of the shield is processed to become transparent.

15. An apparatus as in claim 11 in which the shield stays close to the workpiece support so that the cavity retaining the non-reactive gas has no large leak when the moving means engages the workpiece with the shield.

5 16. An apparatus as in claim 11 in which the workpiece is a semiconductor wafer, and the cavity retains the non-reactive in the vicinity of the circumferential edge of the semiconductor wafer.

10 17. An apparatus as in claim 11 further comprising a shield support means for supporting the shield so that the shield and the workpiece are spaced apart when the moving means disengages the workpiece from the shield.

15 18. An apparatus as in claim 11 in which the moving means for moving the workpiece support comprises a movable shaft connected to the workpiece support.

20 19. An apparatus as in claim 11 further comprising shield alignment means, connected to the shield and the shield support means, for aligning the shield with the shield support means.

25 20. A replaceable multi-thermal zone workpiece shielding plate apparatus for engaging a portion of the workpiece and shielding the engaged portion of the workpiece during processing thereof to prevent processing on the engaged portion of the workpiece in a high temperature processing system, the apparatus keeping the workpiece temperature hot at the shielded area and maintaining the rest of the shield cooler, the apparatus comprising:

- a) a replaceable shield of comparable weight as the workpiece for allowing replacement of the shield in the same way as the replacement of the workpiece;
- 5 a) a low thermal transmittivity section in the portion of the shield to be engaged and shielding the workpiece, the low transmittivity section preventing the heat lost of the shielded portion of the hot workpiece due to less thermal energy transmitting through the shielding portion of the shield, thus maintaining a more uniform temperature at the shielded portion of the workpiece;
- 10 b) a high thermal transmittivity section in the rest of shield, the portion of the shield not engaged with the workpiece having high thermal transmittivity to allow more thermal energy from the heater means and from the hot workpiece transmitting through the shield without heating the shield, thus maintaining a cooler temperature at the portion of the shield not engaged with the workpiece.
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